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REFRIGERATION UNITS *and* OIL BURNERS

VOL. 3 MARCH, 1935 NO. 3

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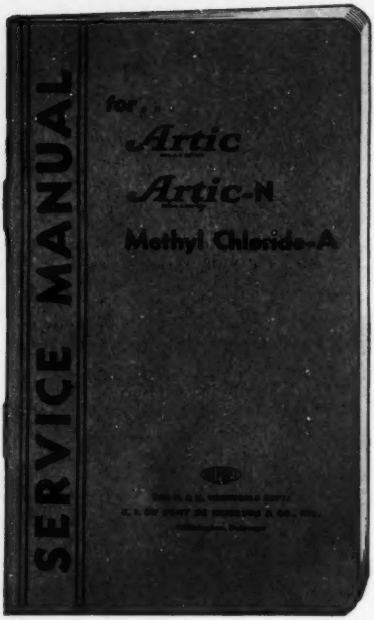

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The Refrigeration Service Engineer

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Refinishing Refrigerator Cabinets

Refinishing the Cabinet. Suggestions How to Proceed and Materials to Use. How Best Results can be Secured.

By FRED H. ROTH

OF course when we discuss refinishing cabinets I assume that there are a number of opinions on how this may be best accomplished. I am offering my recommendations not only from my experience in the servicing business, but also many years study of the chemical compositions of removers, paints and finishers.

Let me first say that as in any work the service man who does his work in a workmanlike manner and does his job conscientiously will accomplish the best results and should experience no difficulty in refinishing cabinets, so that they have that new appearance. It is of course understood that the place we select to do the refinishing job should be as free of dust as possible. Well, let us now proceed with our work.

Refinishing of cabinets must be divided into two distinct groups; first, complete removal of old finish externally and also internally if not porcelain, and, second, refinishing over old finish.

For complete removal purchase one-half gallon good varnish remover. Apply enough coats to thoroughly soften all old finish, keeping entire surface constantly wet. Scrape off all sluff possible with a three-inch painter's scraper or putty knife. Apply another coat all over to soften the undissolved places. Take a handful of No. 3 steel wool and warm water to scour off the remaining scum. Wash metal thoroughly with a very warm, strong Gold Dust solution, being sure to thoroughly rinse off all soap residue. Let dry thoroughly.

You are now ready to respray or brush on your new finish. First apply a fairly heavy coat of combination lacquer primer surfacer, strained through about four thicknesses of beef cloth. Clean gun or brush and apply about three coats of lacquer white ground coat. Let dry about thirty minutes and lightly sand with (280 grit) wet or dry sand paper to remove any lumps or dirt. Spray one coat of gloss lacquer for finish coat, or if a semi-gloss is desired mix half gloss and half white undercoat. These coats dry very rapidly. All above (lacquers, primers, etc.) are reduced 50% with a high

grade lacquer thinner before spraying and strained before putting in gun. Best results are obtained by using 40-lb. air pressure on gun.

For inside refinishing follow the foregoing directions as far as the finish coat. For the final coat I have found an application of heavy, or two medium, coats of Tuttle's Odorless Refrigerator Finish, manufactured by Tuttle's Tite-On Cement Co., which I am informed is available through most first class refrigeration parts companies, most satisfactory. This is the only finish on the market today which I find is entirely odorless. If you do not care to use lacquer you can get both a ground white coater and the Odorless Refrigerator Finish made by Tuttle for a finish for both inside and out. This dries somewhat slower and the final coat must dry over night. This material is available in both brushing and spraying. One gallon of either (lacquer or Tuttle's) finishes three boxes.

For refinishing over old surface, wash box thoroughly with Kitchen Klenzer and warm water. Sand out all chips until edges are smooth. Touch up bare metal spots with primer surfacer. Spray about two or three coats of white undercoater or until box is evenly white all over. Spray on finish coat of desired material. Any holes or dents can be filled up with lacquer spot putty. Apply with a wide putty knife. Allow to dry thoroughly and sand with No. 280 wet or dry sand paper dipped in water or gasoline. Wrap sand paper over flat block of wood about 1½x8″ so it will not dig in, but sand every other coat in the opposite direction—first up and down, then across, etc. For finish coat spray so entire panel stays fairly out to a flat surface. In spraying apply wet so it will dry out to an even gloss as dry or thin coats will fog and orange peel. If this occurs spray a fairly wet coat of thinner over the entire surface; this softens the entire finish way down to the metal and will blow it out smoothly.

Modern Refrigerator Control

Development of Control. Types of Available Controls. Overload Protection. Manufacturing Refinements. Control in the Evaporator. Cycling. Defrosting.

By W. STARK*

CONTROL is the mind center of the domestic refrigerator. It tells the refrigerator when to start and when to stop, protects the motor from overheating and may provide for defrosting the evaporator. It has undergone an intensive period of development during the last five years. This development is a natural part of the growth of the refrigerator industry.

The refrigeration industry has been one of the bright spots in the depression and a major factor in recovery. All branches of this industry have shown marked expansion. The development of the modern domestic refrigerator is familiar to you. The majority of the early installations consisted of separate units assembled and charged on the job with the evaporator often mounted in the former ice box. Most of these early refrigerators employed relatively large evaporators with brine tanks. They were operated at higher temperatures and closer temperature differential than are generally used for present-day refrigerators.

The modern electric refrigerator is a complete device and many are shipped from the factory ready to be plugged into the electric circuit. They must meet much more exacting requirements in the quick freezing of ice cubes and desserts, frozen fruit storage compartments and the reliable refrigeration of foods. These modern refrigerators in general have evaporators with smaller thermal capacity permitting their operation over a wider temperature differential. In order that they can be adapted to all of the user's

* Sales Engineer, Cutler-Hammer, Inc.

requirements, they are equipped with adjustable temperature control.

Development of Control

Control development has paralleled the development of the electrical refrigerator. The early forms of control were most frequently pressure-operated devices. They did not supply any function other than the automatic starting and stopping of the refrigerator to maintain a fixed temperature and were not equipped with cold control for customer adjustment. Pressure-operated devices were most generally used for several reasons. They could readily be attached to the compressor and were, therefore, suitable for a greater variety of applications. The small temperature differentials permitted with these early machines made temperature controls more expensive and less reliable.

Some early variety of temperature operated control employed the warping of bi-metal for the actuating element; others operated due to the expansion of a liquid or gas. One form of early domestic refrigerator control operated due to the expansion obtained when freezing a mixture of water and alcohol.

The modern refrigerator control is almost universally temperature-operated. Likewise it is almost universally built around the limited charged metal bellows. Pressure-operated control is no longer popular for several reasons. Since it must be connected into the compressor system it forms an unnecessary source of gas leakage. Should any control trouble develop, it likewise involves the probable necessity for recharging the refrigerator in order to permit replacement of the control. Pressure-operated control is most conveniently installed in the machine compartment which renders cold control either more complicated or less accessible. Finally, pressure-operated control is an indirect means of accomplishing the result the user is seeking, i. e., control of temperature.

Limited Charged Bellows

The limited charged metal bellows as used in modern domestic refrigerator control consists in general of a corrugated brass metal bellows with a wall thickness of approximately .005". This thin wall bellows is in general made by a hydraulic process in which the metal is first drawn into a closed end tube after which hydraulic pressure is applied to force the walls of this tube into a special die or machine to form the corrugations. To this bellows is attached a capillary tube with a bulb for picking up the temperature at a point remote from the control.

This metal bellows is filled with the saturated vapor of a suitable refrigerant such that all of the refrigerant will be in the vapor state when the bellows assembly is subjected to a temperature a few degrees higher than the maximum operating temperature (seldom in excess of 50° F.). At temperatures in excess of this value the pressure of the refrigerant in the bellows increases only due to gas expansion which is very small as compared to the increase in pressure which would obtain if a greater amount of refrigerant were present so that liquid would be in the system at all times.

A few years ago many of these bellows were filled with sulphur dioxide or Isobutane. Today they are almost universally filled with methyl chloride vapor due to the lower operating temperatures required. A methyl chloride charged bellows as used in modern domestic refrigerator control is satisfactory for temperature operation from zero, or even as low as minus 10° F., to the usual maximum of about 50° F. It can be used for temperatures somewhat higher than 50°, i. e., 60° to 70° F., but such higher temperatures involve excessive pressures requiring heavier walled bellows with resultant loss in sensitivity.

The pressure exerted due to one of these bellows is a function of the coldest temperature at any point in the bellows system. This is readily understood when considering the fact that vapor adjacent this coldest spot will condense. More vapor will flow to this spot and condense until the entire system reaches a pressure corresponding to the temperature of the refrigerant at this coldest spot. The amount of refrigerant in one of these bellows systems is very small, in the order of a drop, and the condensate only a dew on the wall.

The operation of a refrigerator control in which the bellows system is filled with liquid

would be entirely different. In this latter case the pressure exerted by the bellows would be governed by the warmest spot in the system rather than the coldest. The refrigerant at this warmest spot would develop a vapor presure which would be transmitted through the entire system. With a limited fill, however, there is no liquid refrigerant at any but the coldest spot, the rest of the bellows system being filled with vapor. From the above discussion it is obvious that if the bulb is to control the temperature at all times, it must be mounted so that it is always the coldest point in the bellows system.

Control for Hermetic and Open Type

Modern domestic refrigerators can be divided into two general classes, i. e., hermetic or sealed-in type and open type. There are some differences in the control for each. Both require a thermostat for temperature regulation. The hermetic type, however, in general employs some type of relay for controlling the starting winding of the motor. This starting relay replaces the usual centrifugal motor switch. As the motor is enclosed in the gas system the sparking resulting from a centrifugal switch would be harmful.

These starting relays for the hermetic refrigerators are most generally current-operated devices. When the thermostat closes the circuit to start the refrigerator, the heavy inrush or starting current causes the relay to lift its plunger and close the starting contact. As the motor accelerates, the current falls until a value is reached at which the plunger drops, opening the starting contact and closing the running contact.

The motors used with these hermetic refrigerators are of two general types, split phase and condenser. The split phase type of motor has two windings which have different characteristics so as to obtain a difference in phase with a resulting starting torque. There has been considerable development in the design of this type of motor so that they are now available with starting torque comparable to that of the repulsion induction motor. Many of the split phase motors used for hermetically sealed refrigerators have an external starting resistance connected in series with the starting winding. This reduces the heat loss in the motor with resulting greater efficiency.

The capacitor type motor has several advantages for refrigerator service. It is more quiet and efficient in operation and has exceptionally high starting torque when properly applied and controlled. The most commonly used control for the capacitor motor consists of a current operated relay with up and down contacts to transfer connections in an auto-transformer capacitor circuit.

In general, the same type of thermostat unit is used for the control of both hermetic and open type domestic refrigerators. The usual form of thermostat used for modern refrigerators is provided with a cold control adjustment. This cold control knob rotates a screw to vary the pressure on the bellows and consequently the temperature at which the bellows will overcome its spring and operate the contacts. The usual range of cold control adjustment is from 10° F. to 15° F. Another adjustment is generally provided to vary the temperature difference between opening and closing of the contacts. Quite frequently this is used as a factory adjustment only and is sealed to prevent changes. Once the factory has determined the proper differential for a given refrigerator, it is unnecessary to readjust it.

Overload Protection

It is now an Underwriters' Laboratories' requirement that all domestic refrigerators be equipped with an overload for motor protection and this must be of the free tripping type. A free tripping overload is one which will operate even though the reset or start button is held to the closed position. The overload mechanism is generally included as a part of the thermostat unit together with an "off" and "on" switch. The most common form of overload device at present consists of a solder type thermal element operated by a heater placed in the motor circuit. When the current exceeds a safe value for a sufficient length of time the solder melts and a spring causes the contacts to trip. When the solder again hardens, the overload trip can be latched and the contacts closed. Very special sol-

ders are used, for these thermal elements, which have an accurate melting point, much lower than that of ordinary 50-50 solder. If one of these thermal elements should become defective and be resoldered with other than the special alloy as used by the control manufacturer, its tripping current may be greatly changed so that it would no longer furnish motor protection.

The heater coils used in modern refrigerator control have small metal tags carrying their current ratings. These ratings are in turn stamped on the outside of the control box. The Underwriters' Laboratories recommend that this heater should not exceed 140% full load motor current as higher heater ratings may result in incompleted motor protection. This rating should be determined, however, by the relation between the motor full load nameplate rating and the maximum current at which the motor can operate without overheating. Obviously, it is possible for a refrigerator manufacturer to use a motor which is so rated that it may be fully protected by a heater larger than 140% full load motor current and such larger heaters are permissible where the refrigerator manufacturer submits satisfactory proof to the Underwriters' Laboratories.

Manufacturing Refinements

Many refinements have been made in the manufacture of modern refrigerator control during recent years. Some thermostats are designed for a very high degree of accuracy. They will cycle for hundreds of thousands of operations without change in operating temperatures in excess of ½° F. To obtain this high degree of accuracy, controls are operated mechanically for several thousand operations before being set for temperature at the factory. These controls are then placed in ovens for several days to age at a temperature of 150° F., so that when they are placed in service they will show no gradual change in operating temperatures due to aging. In general unaged controls show gradual lowering of operating temperatures. This aging effect may be in the order of two or three degrees over a period of a year. In setting controls to the exact specifications now required by refrigerator manufacturers, it is very desirable to cycle the control as in normal operation rather than to adjust the control in a fixed temperature bath. In order to obtain the highest degree of accuracy it is essential that proper corrections be made for variation of barometer and to adjust all controls to a fixed standard of barometric pressure. Barometric pressure at a given location may be such as to account for as much as one or even two degrees change in temperature setting.

It is common practice for refrigerator manufacturers to make minor changes in temperature settings for high altitudes. Average barometric pressure due to changes in altitude roughly amount to ½° F. per thousand feet change in altitude. It is customary practice to make no correction for altitudes between sea level and about 2000 ft. Above 2000 ft. altitude temperature settings are changed to compensate for the lower average barometer. Modern refrigerator control is equipped with a so-called altitude indicator to facilitate this or any other field change in temperature setting. This altitude indicator is a pointer permanently fixed to the cold control shaft. Changes in temperature settings are made by loosening the knob and moving it to a new position. With this arrangement it is possible at any time to determine whether or not the temperature setting of a control has been changed from the factory adjustment and just how much it has been changed. It is likewise possible to return the cold control knob to the original factory setting.

Control in the Evaporator

It has been common practice in recent years to mount the thermostat either within the evaporator or adjacent thereto. This provides an economical and convenient location for the control. Obviously, the tripping current of the thermal overload device will be increased by such mounting, which is affected by the surrounding temperature. Smaller heater coils should be chosen for such application in order to fully protect the motor.

Control, when mounted in the evaporator, may be subjected to an excessive amount of moisture. It is essential, therefore, that

controls for such application be adequately protected against corrosion and electrical leakage due to moisture. If the overload is mounted within the control, the small heat input in this unit will, in general, prevent condensation.

Cycling Defrosting

At present, there are in vogue, several special control arrangements for defrosting the evaporator. One very commonly used method is to provide a sufficiently wide range of cold control so that the cutin temperature will be appreciably above 32° F. This causes the evaporator to defrost at each cycle and yet maintain refrigerating temperatures. This usually requires a considerable rotation of the dial beyond the warmest normal setting at which no defrosting occurs. Similar results can be obtained with what is usually termed "wide cycle defrosting." Such control has a position beyond the warmest normal operating position at which the cutin temperature is raised to a much higher value, usually about 39° F. This is accomplished without appreciably raising the cutout temperature above the adjacent normal warmest position. This provides slightly lower average temperatures than obtained with straight range control with the same effective defrosting. It involves, however, a loading mechanism with its additional complication and possible trouble.

Automatic Defrosting

Recently a number of controls have been marketed with so-called semi-automatic defrosting. Controls of this type have a separate defrosting lever which after one defrosting cycle returns to normal position. With such control it is only necessary to manually initiate the defrosting cycle, the control automatically returning to normal operation. With semi-automatic defrosting it is essential that cutin temperatures on defrosting be much higher, than that used for the cycling type of defrosting control. This is necessary to insure that all of the frost and ice will be removed before the refrigerator restarts.

Full automatic defrosting can be accomplished in several ways. One method of obtaining full automatic defrosting consists of a clock switch. This makes it possible to control the time of day at which defrosting occurs, but the expense of this type of installation is much greater.

Service Problem

All of this control development leaves in its wake a tremendous control service problem. Not only are there still a few of the early makeshifts to be heard from but even during the past five years there have been a constant procession of complete new control designs entering the field. Some of them have scarcely lasted out the year until they were replaced by a complete new design. You who have observed results know that any completely new product, be it refrigerator, automobile, refrigerator control, or what not, needs the improvement resulting as the aftermath of a year or more in the field before it is fully satisfactory.

Aside from a possible change in temperature setting, the servicing of a modern refrigerator control is usually a matter of replacing the defective unit with a new one. This is necessitated because control faults often require retesting at the factory. The largest single factor in control failures is leaky bellows. This is often caused by undue bending of the central tube.

With an altitude indicator and adjustable cold control knob, the service man can easily raise or lower temperatures as required. A 4 or 4½ ampere heater coil will provide motor protection for the average job.

Perhaps in the not distant future, there will be at least some degree of standardization for refrigerator control. The control service problem will, however, continue to be a complicated one for many years to come.

ROTARY SEAL UNIT

ROTARY REPLACEMENT SEAL UNITS are described in a new folder recently issued, describing its construction and operating principles. A copy of this circular is available by addressing the Rotary Seal Co., 809 W. Madison St., Chicago, in which is listed 21 sizes of replacement units covering a wide range of the popular makes of domestic compressors.

New Refrigerant Control Device for Hermetically Sealed Units*

The Author Describes in Detail a New Arrangement of the High Side Float Valve Intended to Overcome a Difficulty in Present Design Where Condensation of the Refrigerant Occurs Within the Dome.

By FRANK H. STIENING
Associate Professor, University of Pittsburgh

HERMETICALLY sealed refrigerating units may be divided into two general classes, one where the dome of the motor compressor assembly is subject to high-side pressure or exhaust gas from the compressor, and the other where the dome is subject to low-side pressure or suction gas. When the dome of an hermetically sealed refrigerating unit is subject to low-side pressure it is necessary to exhaust the gas from the compressor directly into the condensing coils. Any lubricant entrained with the compressed gas is discharged into the condenser and can be returned to the compressor only by way of the evaporator. It is, therefore, essential that this lubricant be circulated through the entire system and be definitely returned to the oil sump in the base of the compressor.

In order to insure a definite return of this discharged oil to the oil sump it is necessary to use an expansion valve as the liquid control device, in connection with a continuous tube type evaporator. While various devices may be incorporated in the design of the flooded type evaporator to return this oil to the compressor, in most cases they function only to return oil in small, gradual quantities. If, however, a large quantity is discharged from the compressor, it is questionable whether the oil would be returned fast enough to furnish the compressor with the necessary quantity of lubricant for satisfactory performance. When subjecting the dome to low-side pressure, the suction gas returning to the compressor comes in contact with the motor-compressor assembly within the dome, which tends to superheat the suction gas and thus reduce the efficiency of operation to some extent.

In most hermetically sealed refrigerating systems, it has been found advantageous to arrange the dome subject to high-side pressure. With this arrangement any lubricant discharged, together with the compressed gas, will immediately be returned to the oil sump in the base of the compressor assembly. Suitable baffles, etc., are generally provided to prevent large globules of oil from entering the condensing coils. Oil in vapor form may, however, be carried into the condenser, receiver, etc., and finally into the evaporator, but this small, gradual amount presents no special problem, as suitable means can be arranged in the evaporator in order to return it to the compressor. With the dome under high-side pressure, various types of liquid control devices may be used and the advantages of a flooded low-side are easily available.

The type of compressor used will determine to a large extent whether the system be designed with the dome subject to high- or low-side pressure. Rotary and gear type compressors require relatively large quantities of oil to be injected into the compression chamber in order to seal the moving parts properly. This oil is discharged from the compressor along with the compressed gas. It is therefore practically necessary when using either a rotary or a gear type compressor, to design the unit with the dome subject to high-side pressure. With this arrangement the oil discharged along with the compressed gas is returned immediately to the oil sump and there is very little danger of draining the oil sump of the

* Paper presented at meeting of American Society of Refrigerating Engineers, New York City. Reprinted from Refrigerating Engineering.

necessary quantity of oil for satisfactory operation.

With the dome subject to high-side pressure a very serious problem of preventing condensation within the dome is encountered. With this arrangement the compressed gas is exhausted from the compressor directly into the inside of the dome and heat may be removed from this gas sufficient to cause condensation before it enters

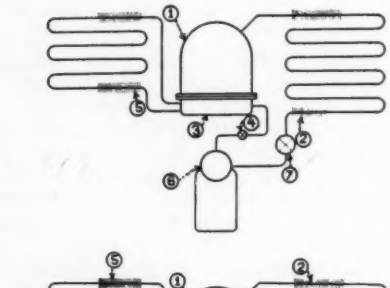

FIG. 1 (ABOVE). CONVENTIONAL ARRANGEMENT.
FIG. 2 (BELOW). REVISED ARRANGEMENT.

the external condensing coils. This condensate drains to the oil sump where it either dilutes or displaces the lubricating oil, depending upon the character of the refrigerant.

When sulphur dioxide is used as the refrigerant the condensed sulphur dioxide, being heavier than the lubricating oil, will drain to the bottom of the oil sump and a stratification of the oil and sulphur dioxide will occur and the oil will float as a distinct layer on the top of the condensed refrigerant. When this condition occurs the oil inlet ports to the oil pump and oil seal will be fed liquid sulphur dioxide, as they are generally located at the lowest point in the base. A unit operating under this condition will become noisy and its refrigerating capacity will be greatly reduced. Continuous operation in most cases will not correct this condition and the condensate will remain in the base of the compressor. If the compressor is supplied with cool lubricant from an external cooling coil the tendency for the refrigerant to condense will be increased, especially if the cool oil is sprayed down over the motor-compressor assembly and the compressed gas within the dome.

Various methods have been used in an effort to eliminate condensation in the dome. One design places an electrical heating element in the base of the compressor assembly, encased and submerged below the oil sump. This heating element consumes approximately twelve watts of electrical energy and is so connected in the electrical circuit that it supplies heat to the oil sump regardless of whether the thermostat of the unit is in the on or off position.

The heat generated by this heating element has the tendency to prevent condensation from taking place within the dome and at the same time will drive out any condensate that has collected below the oil level in the sump of the compressor. This, however, represents a rather inefficient method for correcting or eliminating the above difficulty, in view of the fact that it is desirable to condense the gas at this point in the refrigeration cycle. In view of present demands for economical operation, it is questionable whether it is advisable to expend this amount of electrical energy in order to correct a condition that is inherent in the original design.

Another design presents a different arrangement for correcting this difficulty by placing an insulated covering over the compressor dome assembly, the purpose of which is to retain enough heat within the dome during the off cycle of the unit to prevent condensation from occurring. This method is satisfactory in warm weather but unsatisfactory in cold weather when the comparatively long off periods allow the entire compressor assembly and oil sump to become

cooled to a point where condensation will occur within the dome when the unit first starts to operate again. Location of oil ports for both lubricating and sealing purposes are important with this arrangement, as some condensation is likely to occur at all times. The insulating cover can hardly be classed as a definite and dependable arrangement for correcting this trouble.

Fig. 1 shows the conventional arrangement of an hermetically sealed refrigerating system. The compressed gas is discharged into the dome, from which it is fed to external condensing coils. The condensed refrigerant is next fed through a suitable liquid control device into the evaporator. This liquid control device may be an expansion valve, high or low pressure float valve, or capillary tube. The high pressure float valve has met with favorable success when used in connection with an hermetically sealed refrigerating system, owing to its rugged, simple construction.

After leaving the liquid control device the liquid refrigerant, together with a small quantity of oil, enters the evaporator. The liquid refrigerant is then evaporated and returned to the compressor, but some special arrangement has to be provided within the evaporator in order to return the oil. Fig. 1 also shows an external oil cooling coil. The cool oil after being returned to the compressor may be used in lubricating the various moving parts and may also be sprayed down over the motor, etc., for cooling purposes. This relatively cool oil, coming in contact with the compressed gas within the dome, causes some condensation to occur and the condensate drains to the bottom of the oil sump.

Fig. 2 shows a revised arrangement, similar to the conventional arrangement with the exception that the external liquid control device has been eliminated, and a high pressure type float control has now been located within the dome in the depressed region of the base. As shown, the base of the compressor assembly has been redesigned and the condensing coils have been so arranged that the condensate returns to the base of the assembly. With this arrangement it may be entirely possible to eliminate the external condensing coils by providing sufficient radiating surface on the dome which would serve as the condenser for the system. A forced or natural draft cooling system can be used, depending upon the general arrangement desired. Inasmuch as condensation is desired within the dome, the cool oil in this case can be used most effectively in condensing the compressed gas.

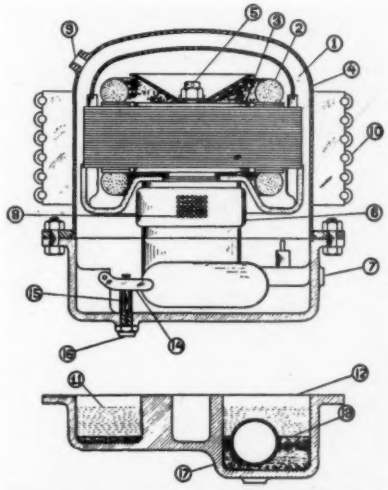

FIG. 3 (ABOVE). CROSS SECTION OF MOTOR COMPRESSOR UNIT WITH NEW TYPE REFRIGERANT CONTROL DEVICE.
FIG. 4 (BELOW). CROSS SECTION OF COMPRESSOR BASE TAKEN AT RIGHT ANGLES TO THE SECTION SHOWN IN FIG. 3.

Fig. 3 shows a cross section of the motor compressor unit with the new type refrigerant control device. Fig. 4 shows a cross section of the compressor base taken at right angles to the section shown in Fig. 3. Referring to Figs. 3 and 4 the reference numeral (1) indicates in general a sealed motor-compressor assembly of the hermetically sealed type. In accordance with usual practice, an electric motor, comprising a stator assembly 2 and a squirrel cage rotor 3, is mounted within a steel dome 4 and is so arranged as to drive the rotor shaft 5 of the rotary compressor 6. Under action of the compressor the gaseous refrigerant is drawn into the suction port of the compressor through the intake tube 7 in the base of the compressor. The gas is subsequently com-

pressed in the compressor and discharged into the dome through the acoustic muffler 8. Some of this compressed gas condenses directly in the dome while the remainder may pass from the outlet 9 into the external condensing coil 10, where it is condensed and returned to the base of the compressor assembly.

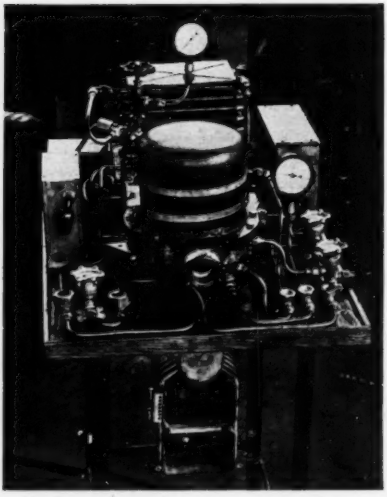

FIG. 5. COMPRESSOR BASE ARRANGED WITH DEPRESSED SECTION IN WHICH A FLOAT MECHANISM IS MOUNTED.

Lubricating oil from the cooling coils may be pumped up the center of the rotor shaft and sprayed from the openings in the nut on the top of the rotor shaft 5. This cool oil, spraying down over the compressed gas within the dome, provides an effective means for removing heat from gas and is instrumental in condensing the refrigerant.

Liquid sulphur dioxide has a specific gravity of approximately 1.4 (depending upon its temperature), whereas the lubricant, a highly refined, water-white mineral oil, has a specific gravity of approximately .9. Therefore, the condensed sulphur dioxide, not being completely miscible in the oil, drops through the oil layer 11 and settles to the bottom of the compressor base 12. Due to the stratification of these two liquids, the oil layer 11 lies upon the pool of liquid refrigerant 13 and makes it possible to draw oil and liquid refrigerant in distinctly independent streams from the common receiver.

It so happens that the lubricant is soluble to some extent in sulphur dioxide, the degree of solubility depending upon pressure and temperature. It is therefore probably more accurate, in the stratification of these two liquids, to refer to the lower layer 13 as the sulphur dioxide-rich body, and the upper layer 11 as the oil-rich body.

Owing to this stratification of the liquid sulphur dioxide and the lubricating oil, it is possible to locate the oil inlets to both the oil pump and oil seal of the compressor, so that only liquid from the oil-rich body can enter at these points. It is further necessary to eliminate the possibility of globules of condensed sulphur dioxide from entering these oil entrances as they sink through the stratified layer of the lubricant-rich body.

The sulphur dioxide, as it condenses, drops through the oil-rich layer mainly in globule form, and into the sulphur dioxide-rich layer. Any sulphur dioxide condensed in an external condenser is fed directly to the sulphur dioxide sump. The compressor base as shown in Figs. 4 and 5 is so arranged with a depressed section wherein a float mechanism 14 is mounted. This float mechanism is designed so that the float ball will sink if submerged in the oil-rich layer, but will float if subject to the more dense liquid sulphur dioxide in the sulphur dioxide-rich layer. In the actual construction of the working model shown in Fig. 6, it was found that the float performed in a satisfactory manner when the buoyancy was such that it would just float in a liquid having a specific gravity of 1.

The operation of this new high-side float arrangement is as follows: When sufficient liquid sulphur dioxide has condensed and drained into the depressed portion 17 of the base 12, the float ball will be buoyed up, opening the needle valve 15, thus permitting a flow of the sulphur dioxide-rich liquid into the evaporator through the outlet 16. This action of the float valve is practically the same as the conventional high-side float. The float ball, being so designed, will sink and thus close the needle valve, if at any

time the oil level is reduced to the vicinity of the outlet 16. If, however, the float valve does not seat properly the entire amount of sulphur dioxide ordinarily retained in the base of the compressor may tend to drain into the evaporator. Owing to the limited space in the evaporator, any excess liquid will immediately be drawn back through the suction line to the compressor, and it will be practically impossible to drain the compressor sump of its required oil supply.

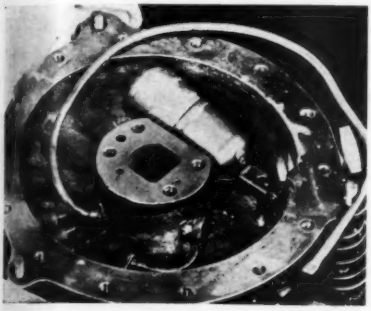

FIG. 6. WORKING MODEL OF REFRIGERATING UNIT USING NEW HIGH-SIDE FLOAT ARRANGEMENT.

With the above described arrangement it is impossible to limit the action of the float due to a condition which is ordinarily referred to as a gas-bound float. This is a common difficulty with the conventional high-side float valve and in most cases a purge connection must be located on the float chamber to discharge any air or inert gases which may collect in the upper part of this chamber.

No data are available and no tests have been conducted to determine the effect on capacity of the device outlined above as compared with a similar unit using the conventional high-side float valve. Practical tests, however, have shown the new arrangement to be entirely satisfactory.

KARLBERG SEAL

A NEW design in the construction of a seal unit having several exclusive features has just been perfected by A. E. Karlberg, engineer of the Trico Compressor Service, Chicago. This seal is built to satisfy the need of a replacement seal for any make compressor and will restore an inefficient compressor to its original standard of perfection and is available to fit any size of compressor shaft. It is also available for use as a replacement for the old graphite type Servel seal. A removable nose piece makes it possible to fit the Karlberg seal to nearly any make or model of machine by merely inserting a longer or shorter nose piece. It can be supplied for either ½ inch or ⅝ inch shaft, or larger size if required.

The seal assembly consists of brass body, "round" wire German spring steel spring, "Sabeco" seal nose, two Duphin packing rings and two brass washers. Assembly is securely held within the brass body by a piano wire spring retainer which seats in a groove. Patent rights are fully covered. Full information regarding this new seal can be obtained by writing the manufacturers direct.

NEW REFRIGERANT BOOKLET BY VIRGINIA SMELTING CO.

A NEW booklet recently compiled by the Virginia Smelting Co., West Norfolk, Va., contains interesting information on various refrigerants. In addition to including properties and characteristics of the refrigerants, valuable information in convenient tabular form is also contained therein. The booklet contains 36 pages and is 5x7½" in size.

FEDDERS APPOINTMENTS

THE appointment of H. W. Blythe Co., 2334 S. Michigan Ave., Chicago, Ill., as a jobber of Fedders refrigeration equipment has been announced by Mr. Mare Shantz, manager of the Fedders Mfg. Co., Chicago office. Also the Refrigeration and Industrial Supply Co., 422 S. 7th St., Minneapolis, Minn., to handle the well known Fedders products in that territory.

Another Fedders jobber serving the St. Louis territory, The Spangler Co., has recently moved to larger quarters at 3829 Market St., St. Louis, a few doors from their old location.

Thermo Expansion Valves*

Their Purpose—Operation Service and Installation Pointers—Applications

BY
DAN D. WILE

IN discussing the thermostatic expansion valve I hope to make very clear to you just what this valve does in the refrigerating system, how it functions and how it should be applied to the system. Any of you men who have heard me talk on this subject before will recall that the one very important thing to remember is that *the thermostatic expansion valve keeps the coil completely refrigerated.* The entire engineering and service of the valve must hinge about this simple statement that *when properly installed the thermostatic expansion valve keeps the coil completely refrigerated.*

When the bulb is clamped to the suction line of an evaporator the valve simply maintains this point on the suction line slightly warmer than the temperature of the refrigerant. In other words, it maintains a small amount of superheat at the suction line. Fig. 1 shows a characteristic curve of the superheat maintained by the thermostatic expansion valve and it will be noted that this adjustment is maintained nearly constant throughout a wide range of suction pressure. This uniform operation is accomplished by making the power element bellows of a slightly different area than the valve bellows and proper adjustment of the springs. By having this uniform superheat characteristic the valve can be used to control a unit working at very low temperature, such as an ice cream cabinet, or a unit working at high temperature, such as an air conditioning unit, without changing the adjustment. Years of experience in the manufacture of these valves has shown us that approximately 10 to 12 degrees superheat is correct for almost every condition encountered. We have found that when the valve is properly installed it is seldom necessary to change the factory setting.

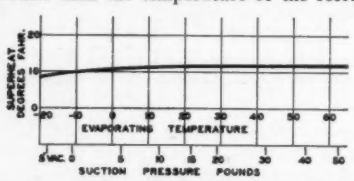

FIG. 1. CURVE OF SUPER-HEAT MAINTAINED BY THEMOSTATIC EXPANSION VALVE.

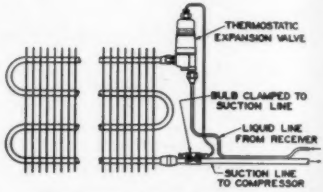

FIG. 2. THERMOSTATIC EXPANSION VALVE CONNECTED TO STANDARD FIN TYPE COIL.

Fig. 2 shows a conventional hook-up of the thermostatic expansion valve connected to a standard fin type coil, and it will be readily understood that if the point on the suction line where the bulb is clamped is maintained 10° warmer than the refrigerant in the tubes that the coil will be kept completely refrigerated without allowing cold refrigerant to pass into the suction line. If the refrigerant should tend to flood over the bulb immediately becomes cold and reduces the pressure in the power element bellows, tending to close off the valve. On the other hand, if the coil has insufficient refrigerant the bulb will warm up and open the valve so as to admit the proper amount.

Note also in Fig. 2 that the liquid line has been soldered to the suction line for a short distance so as to form a heat exchanger.

* From a paper presented at convention of the R. S. E. S.

Where it is necessary to prevent sweating on the suction line or in very low temperature work to overcome frosting outside of the cabinet or case this heat exchanger arrangement proves very desirable. Today there is a growing tendency towards the use of heat exchangers of this type.

In connection with the proper adjustment of the valve on the job, I want to emphasize the importance of allowing the system to run for a short time before attempting to change the adjustment. If after sufficient time has been allowed it is found necessary to change the adjustment this should be done slowly. Most often it will be found that the thermostatic bulb has not been located properly or is not tightly clamped to the suction line or possibly some other condition is causing the trouble, and when this is corrected the valve will work properly without re-adjustment.

Keep in mind that the power element must be warmer than the thermostatic bulb or otherwise the thermostatic liquid will accumulate in the power element and control from that point, with the result that the coil is starved. Furthermore, it is very important that the thermostatic bulb is so located that it will not warm up too fast during the shut down period, otherwise the valve will open up and flood the coil, with the result that the suction line frosts back momentarily at the start of the next operating cycle.

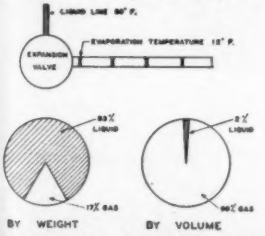

FIG. 3. PROPORTION OF LIQUID IN REFRIGERANT LEAVING EXPANSION VALVE OR FLOAT VALVE.

In the application of an expansion valve to a refrigerating system it is very important that we have a clear conception of what goes on inside of the evaporator tubing. Sometimes we hear of the coil being full of liquid or full of gas where actually as a matter of fact it is probably full of a mixture or sort of emulsion. When the warm liquid refrigerant passes through the expansion valve and expands to a lower pressure, a considerable proportion of the liquid is turned into a gas in order to cool the liquid itself down to the low temperature. Fig. 3 shows graphically the proportion of liquid and gas entering the evaporator, and it will be noted that under this condition of 80° F. liquid temperature and 12° F. evaporation temperature that approximately 17 per cent of the liquid is immediately vaporized into gas. This is, of course, by weight. Now, when we consider

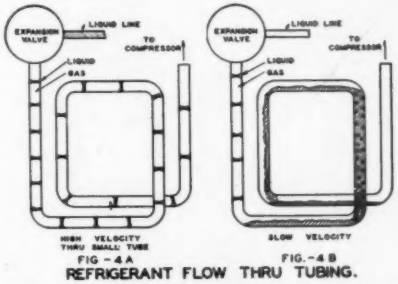

FIG. 4. BEHAVIOR OF REFRIGERANT AFTER IT HAS PASSED INTO THE EVAPORATOR.

the proportions that exist in the tube by volume an entirely different picture is realized, thus we have 2 per cent liquid and 98 per cent gas. If you have ever observed refrigerant expanding into a glass tube you can easily appreciate the small percentage of liquid that leaves the expansion valve. Furthermore, when you open the valve on a drum of refrigerant so as to blow out liquid you can appreciate that a great deal of expansion has occurred.

Fig. 4 shows the behavior of the refrigerant after it has passed into the evaporator. If the velocity is high the liquid is carried along by the gas in the nature of a mist or spray, but if the velocity is very slow such as would be encountered in a small capacity compressor operating on an evaporator with very large tubing, the liquid settles out so that the evaporator may be almost completely full of liquid. When this condition occurs there is likely to be slugging of liquid through the evaporator tubing with erratic operation.

I want to call to your attention now several interesting applications of the thermostatic expansion valve. Fig. 5 shows a water

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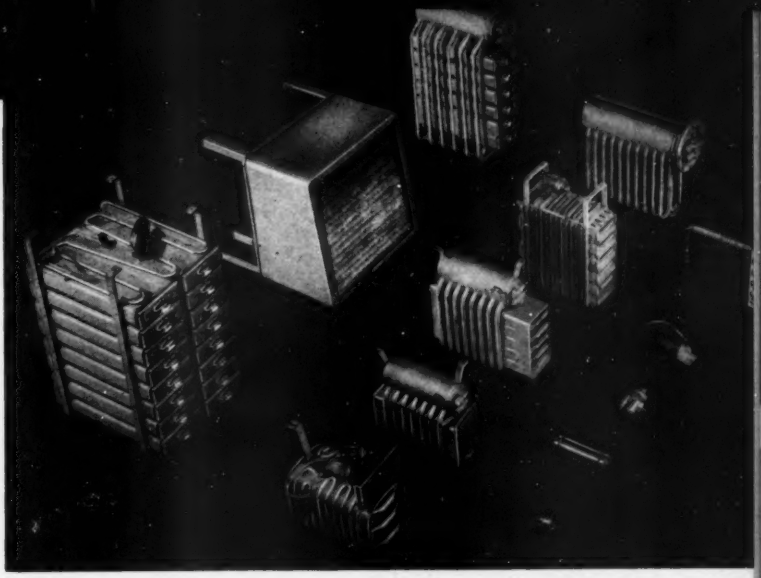
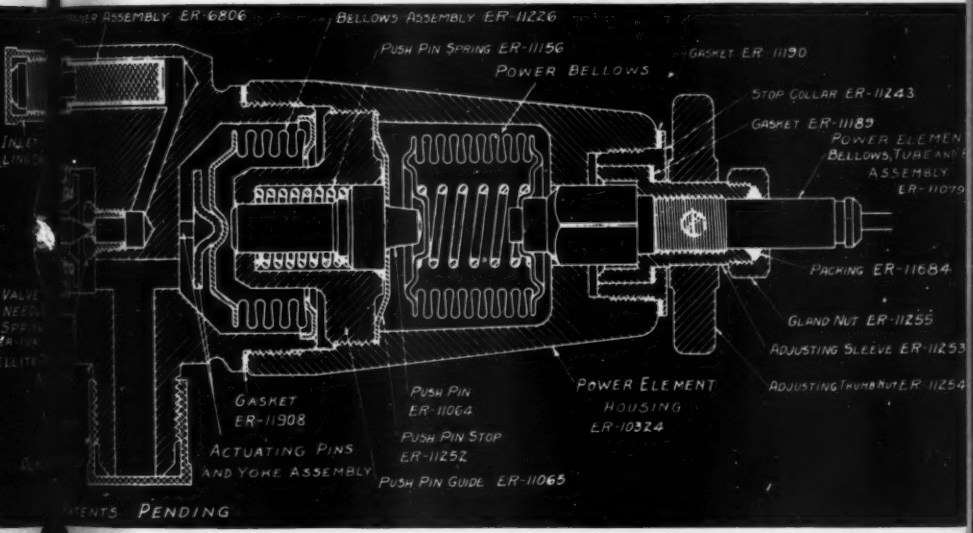


Photograph of part of the complete line of Fedders Standard Low Side Refrigeration Appliances illustrated and described in Fedders Bulletin 75. When you need refrigeration appliances you can get them from Fedders



PATENTS PENDING

CLEVELAND, OHIO
Debes & Company

DALLAS, TEXAS
Fedders Manufacturing Co.

DENVER, COLO.
Auto Equipment Company

DETROIT, MICH.
W. C. DuComb Company

FERNWOOD, MISS.
Enochs Sales Company

GREENSBORO, N. C.
Home Appliance Service Co.

HOUSTON, TEXAS
Walter Refrigeration Supply Co.
D. C. Lingo Company

KANSAS CITY, MO.
Natkin & Company

LOS ANGELES, CALIF.
Franklin G. Slagel

MINNEAPOLIS, MINN.
Refrigeration & Industrial Supply Co.

NEW ORLEANS, LA.
Enoch Sales Co.

NEW YORK CITY
Fedders Manufacturing Co.
Melchior, Armstrong, Dessau Co.

PHILADELPHIA, PA.
Melchior, Armstrong, Dessau Co.

PITTSBURGH, PA.
William M. Orr Co.

ST. LOUIS, MO.
The Spangler Company

U. S. Pat. No. 1,974,631
No. 1,987,948

bath such as might be used in a beverage dispenser in which an ice reserve is maintained and the thermostatic expansion valve is used to control the amount of ice. It will be noted that the expansion valve feeds into the bottom of the coil and that the suction line is looped downward so that the bulb can be clamped in a position to limit the amount of ice. For this application the pressurestat on the system must be set at a pressure below the freezing point and the expansion valve re-adjusted so that it will shut off

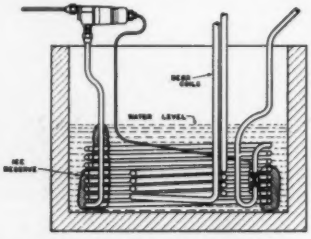


FIG. 5. ICE RESERVE CONTROLLED BY THERMOSTATIC EXPANSION VALVE.

as soon as ice forms around the bulb. Ordinarily we place cooling coils in the top of a space to be cooled, or in brine tanks the coils are usually placed near the top, but in this hook-up the coils are located near the bottom for the reason that water reaches its maximum density at 39.1° F. and below that point the cold water circulates upward instead of downward.

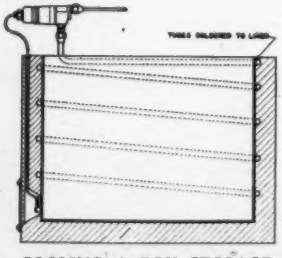


FIG. 6. COOLING A DRY STORAGE COMPARTMENT FOR COOLED GOODS.

Fig. 6 shows a scheme for cooling a dry storage compartment for bottle goods. The evaporator tubing is coiled around and soldered to the liner. The expansion valve feeds into the top and the thermostatic bulb is clamped to the liner at the bottom near the end of the evaporator tube. For quick response the pressurestat on the system should be set at a fairly low pressure and the expansion valve re-adjusted so as to prevent the temperature going too low. By this arrangement the valve will keep the entire liner refrigerated when warm bottle goods is placed in the container, but as the temperature becomes colder the valve tends to starve the coil until finally only a small portion of the tube near the top is working, which is just sufficient to maintain the desired temperature after the load has been properly chilled.

Fig. 7 shows a new arrangement for attaching the evaporator tubing to the liner of a low temperature unit such as an ice cream cabinet. The tubing is looped up and down so as to form pockets for the refrigerant to settle into during the shut-down period. In this type of work there has always been a tendency for the liquid refrigerant to settle towards the bottom of the tubing and cause frosting back at the beginning of the operating cycle. This condition, of course, is most likely to occur when the tubing is merely wrapped around the liner, but with

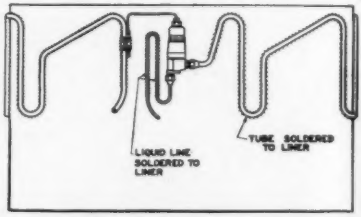


FIG. 7. NEW ARRANGEMENT FOR ATTACHING EVAPORATOR TUBING TO LINER OF LOW TEMPERATURE UNIT.

the arrangement shown in Fig. 7 the refrigerant settles at the bottom of each of the loops so that it is equally distributed around the cabinet and overcomes the tendency to frost back. Note that the liquid line has been soldered to the liner between the location of the thermostatic bulb and the cold tube leaving the expansion valve. This arrangement prevents the bulb from becoming chilled by conduction before the evaporator has become completely refrigerated. Instead of soldering the liquid line to the liner we have also found that approximately the same effect is accomplished by soldering the liquid line to the suction line, as shown in Fig. 2,

and by continuing the liquid line up to a point a few inches from the thermostatic bulb it acts to keep the bulb warm until the evaporator is completely working.

We have done considerable research work during the past few years on the corrosion that occurs at the needle and seat of expansion valves. We have found that whenever moisture is present in a system a corrosive condition is set up which will attack the needle and seat of the expansion valve first. Where the amount of moisture is excessive it, of course, freezes up the valve and causes immediate trouble and dryers must be used. Calcium chloride has been generally used for this purpose, but we have found that even though the calcium chloride removes the danger of freezing up it exaggerates the corrosion. This occurs even though the dryer is left in the system for only a short period of time.

As a general figure, capacity of the thermostatic expansion valve can be considered as 2 tons on Freon, 3 tons on SO_2 and 4 tons on methyl chloride. These values are for air conditioning service where the head pressure is low and the suction pressure is high. Slightly higher capacities will be obtained on service where the head pressure is higher and the suction pressure is lower.

IN THE APRIL ISSUE

Interesting Questions and Answers on the Installation, Application and Servicing of Thermostatic Expansion Valves will appear. These Questions and Answers are based on actual operating conditions.

NEW SUPPLY HOUSE OPENS

OF interest to all refrigeration service organizations is the opening of a refrigeration parts house at 5738 W. Chicago Ave., Chicago, Ill.

Mr. Harold Jacobs and associates are operating this supply house. All are well known and have long been identified in the refrigeration field and are familiar with the problems and needs of service organizations.

NEW YORK CITY MASTER REFRIGERATION ASSOCIATION MEETS

AN open dinner meeting of the Master Refrigeration Assn., Inc., New York City, was held on February 8. The meeting included among those present, manufacturers, wholesalers, chemical concerns, ice machine manufacturers, representatives of accessory manufacturers, supply sources, in addition to a large proportion of the regular members of the organization. The object of the open dinner meeting was to give those interested an opportunity to learn the purposes of the Master Refrigeration Assn., Inc.

A complete reading of the proposed New York City ordinance governing the installations and servicing of equipment of all sizes was read by President J. G. Riordan. The assembly was advised of the accomplishments of the Association in having newspapers and other publications refuse false and misleading advertising. Also discussed was the establishment of membership credit bureaus, information and library facilities, cooperation with refrigeration trade schools, broadened purchasing powers, centralization of costs, adoption of uniform contracts of various applications, and the establishment of customer and dealer charge rates.

For the further information of the guests of the Association articles of the constitution of the Master Refrigeration Assn., Inc., were read dwelling especially upon those eligible for membership and the constitutional objects of the Association.

The By-Laws Committee rendered its report of placing in the presence of legal counsel its findings for legal construction.

REMPE CIRCULAR

THE Rempe "Fin Coil" Co., Chicago, Ill., has issued a four-page circular on its line of steel, aluminum and copper fin coils. It is completely illustrated and presents brief facts concerning the outstanding features of each product in this line. A copy of this circular will be sent to interested parties who write the company for same.

THE Question BOX

Readers are invited to send their problems pertaining to the servicing of household refrigerators and small commercial refrigerating equipment as well as oil burners to "The Question Box" which will be answered by competent authorities.

THE following questions submitted to this department are answered by Mr. George H. Clark, chairman National Educational and Examining Board, Refrigeration Service Engineers Society.

Have any readers other opinions regarding the problems involved. Send them to the Editor.

Question 62. What amount of refrigerant should be used in Frigidaires and Kelvinators, all models, and what should the pressure be on the high and low sides when in normal operation?

ANSWER: There have been so many models of Frigidaire and Kelvinator machines manufactured in the last fifteen years that a complete list of them and their normal operating pressures and refrigerant charges might resemble a telephone directory, if such information was obtainable.

In general, expansion valve systems should have a total charge of 1 to 2 lbs. of refrigerant. Eight ounces is sufficient to operate most of them and the added amount acts as a reserve in the liquid receiver.

In flooded type evaporators, it may be found most practical to estimate the capacity of the evaporator filled to operating level in pints of liquid. A reserve in the receiver should be maintained equivalent to approximately one-half of the evaporator capacity. For sulphur dioxide and Freon, each pint of liquid is equivalent to about 1.5 lbs. For methyl chloride and ethyl chloride, each pint is equivalent to about 1 lb. For Isobutane, each pint is equivalent to about 10 ounces.

In general, single unit household machines will be provided with a receiver large enough to hold the full charge of refrigerant.

For systems using an expansion valve, thermostatic expansion valve or low pressure float valve, the refrigerant charge is not critical. The proper amount of refrigerant in the system is enough to fill the evaporator plus a small reserve in the receiver and may be increased above this amount up to a total amount equal to a full charge for the liquid receiver. Any point in between these two limits will not affect the operation of the machine to any appreciable extent. It is merely a matter of the amount of reserve liquid in the system.

With respect to the suction pressures and head pressures that should obtain with various types of Frigidaire and Kelvinator machines, this is rather difficult to state. For dry type direct expansion valve evaporators, an evaporation temperature of from —5° to plus 5° is usually desirable. For brine tanks, the suction temperature is usually from 0° to 8° provided that the machine is equipped with a cold control for fast freezing. On the older type of brine tank systems, evaporating temperatures of from 5° to 12° were usually used, especially in conjunction with frost back control. If sulphur dioxide is the refrigerant used, the suction pressure may be found for the corresponding suction or evaporation temperature by referring to the Table on Page 2 of Lecture Course No. 3, issued by the Refrigeration Service Engineers' Society.

The temperature noted in the first column of this Table corresponds to the evaporating pressure given in Column No. 2. This pressure is given in lbs. per square inch absolute pressure. To get this in gage pressure, we can subtract 14.5 lbs. from the absolute pressure in order to change our absolute pressure to gage pressure. If the result is negative, the pressure is thus denoted as being less than atmospheric pressure. Each lb. per square inch of vacuum is shown on the gage as 2 inches of vacuum and the suction pressure on the system may be set accordingly.

A reference to Bulletin 1 issued by the Society will show the relation between inches of mercury vacuum or pressure to lbs. per square inch of vacuum or pressure.

As an example, let us say that we have a dry type evaporator on which we want to maintain a 0° evaporation temperature.

From Page 2 of Bulletin 3, we find that at 0° the sulphur dioxide has vapor pressure of 10.35 lbs. absolute. If we subtract from that 14.5 lbs., which is an average atmospheric pressure throughout the Middle West, we have a vacuum of 4.15 lbs. per square inch. If we multiply this by 2, we get about 8.3 inches of mercury vacuum, which is the proper expansion valve setting.

With respect to head pressure, if the machine was operating in air at a temperature of 80°, we could proceed to find the head pressure at which it should operate as follows: Allow a condensing temperature 20° higher than cooling air temperature. Thus with the air at 80°, we would allow ourselves a 100° condensing temperature. On Page 2 of Bulletin 3, we find that this gives us an 84.52 lbs. absolute condensing pressure. Subtracting our atmospheric pressure from this absolute pressure, gives us 70 lbs. gage pressure and our head pressure at the machine should be not more than 15 lbs. above or below this pressure unless there is something wrong in the system. It should be kept in mind, however, that the 80° temperature which we are considering is temperature of the air at the machine and not necessarily in the room in which the machine is located, as in some cases the temperature in the machine compartment of a built-in refrigerator may be from 10° to 50° above room temperature and the condensing pressure will correspond to a temperature approximately 20° above the air temperature at the condensing coil.

Question 63. (a) Why is it important to see that no part of the capillary tube of a thermostat touches any part of the evaporator?

(b) How do you check to find out if the power element or bellows of a thermostat has lost its charge?

(c) How do you determine when an overload meter coil is defective in a thermostat?

ANSWER: (a) The pressure operating the switch of a temperature control is determined by the temperature of the refrigerant at a liquid and vapor surface. If the capillary tube touches a cold part of the evaporator, it may operate from that temperature rather than from the bulb temperature if the bulb temperature is higher; provided that the control has insufficient charge to completely fill the capillary tube with liquid at the cold point.

(b) Check control bellows for change in force for corresponding change in bulb temperature. In general, when the bellows can be collapsed with less than 30 lbs. of force per square inch of bellows cross sectional area with the bulb in a warm condition, you may be quite sure the control has lost at least part of its charge and that no liquid is present in the bulb.

(c) Put a parallel bank of lights in series with control and a 110 volt line. Add lamp wattage by adding lamps or increasing lamp size until overload cuts out. Figure current in circuit as follows: the current in amperes is equal to the total watts in the lights divided by 110 volts. The overload coils should operate at from 20 to 40 per cent above motor name plate current rating.

S S S

NEW PARTS HOUSE

THE H. W. Blythe Company, Chicago, have just opened a wholesale department for the sale of all kinds of refrigeration parts and equipment. Mr. Blythe has owned and operated The Bumper Sales Company at this location for the past fifteen years. He has associated with himself Mr. H. S. Dekker, who is well known by refrigeration service engineers, and who will have charge of the refrigeration department.

The H. W. Blythe Company will carry in stock at all times, a full line of standard refrigeration equipment for service men, so as to supply their wants at the earliest possible moment. They will also endeavor to enlarge their stock by supplying anything the service man may desire for independent servicing.

The firm has just issued a very attractive catalog which will be mailed to any refrigeration service engineer upon request.

S S S

H. Morgan
Illinois

Here is my renewal. Keep the R. S. E. coming.

The REFRIGERATION SERVICE ENGINEER

A Monthly Illustrated Journal, Devoted to the Interests of the Engineer Servicing Refrigeration Units, Oil Burners and other Household Equipment.

Vol. 3 March, 1935 No. 3

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Official Organ
REFRIGERATION SERVICE ENGINEERS' SOCIETY

AGAIN WE PREPARE

EMERGING from the hibernating state we see definite indications of the servicing business longingly looking forward to that season of never-ending service calls. Longer days—the sun constantly advancing to its meridian—the closeness of Spring—are welcome signs that "Old Sol" is going to make its usual demands on refrigerating equipment. In homes where false economy has dictated the shutting down of the electric refrigerator entirely during the winter months, it will again be called upon to do its job of preserving the family perishables and, consequently, will be subject to mechanical ills.

One encouraging sign in this important job of servicing as we approach each new season is a very definite trend upon the part of the purchasers of refrigeration service to be as cautious in the selection of their refrigeration service man as they are in the selection of men of other professional services which they may use. It is, of course, gratifying to record the service organizations that have established themselves on a business-like and ethical basis are accomplishing the all-important purpose of building customer confidence, because after all no business can exist for any period without this most important asset. It has been no easy job, but gradually "the sheep are being separated from the shotes." Nevertheless, we constantly hear of the practices adopted by irresponsible persons in their anxiety to secure a quick monetary return from what appears to them a lucrative business, without any expectation of establishing themselves as legitimate service companies. We are all too well acquainted with some of these "fly-by-nights" whose inefficient work we must admit oftentimes reflects generally upon all service men and organizations.

To correct some of these evils we can take a leaf from the book of any group of business men combating such practices. Concerted effort is the way to accomplish this job, usually through the powerful medium of advertising. In mentioning advertising, we don't suggest the adoption of elaborate programs beyond the means of those called upon to contribute to such an effort, but some definite inexpensive way of informing the purchasers of servicing the necessity of care in their selection of the refrigeration service man. This might be in the form of small folders which could be included in the monthly bills or statements, or personal solicitation, or might be a cooperative arrangement as we have been informed is being adopted by groups of service men in smaller communities where they have entered into a cooperative advertising arrangement. The foremost thing to bear in mind is that any advertising material of this nature should be constructive. It should be devoted entirely to the selling of service of qualified servicing organizations and to strongly set forth that these service companies are vitally interested in the building of their future business. As a consequence they are relying upon the quality of their work which they do today to build this future business.

An effort of this kind is not necessarily expensive but it can be made most effective in the correction of local conditions.

The servicing business, as a whole, represents a considerable investment today. Its increasing growth has gained for it a recognition of its future importance.

REFRIGERATION SERVICE ENGINEERS' SOCIETY

Official Announcements of the activities of the National Society and Local Chapters appear in this department as well as articles pertaining to the educational work of the Society.

THE OBJECTS OF THE SOCIETY

To further the education and elevation of its members in the art and science of refrigeration engineering; with special reference to servicing and installation of domestic and small commercial equipment; for the reading and discussion of appropriate papers and lectures; the preparation and distribution among the membership of useful and practical information concerning the design, construction, operation and servicing of refrigerating machinery.

ASSOCIATION HEADQUARTERS: 433-435 North Waller Ave., CHICAGO, ILL.

Memphis and Kansas City Apply for Charters

APPLICATIONS of two new local chapters have been placed before the Refrigeration Service Engineers' Society during the past month. Service men of Memphis, Tenn., and Kansas City, Mo., have forwarded formal applications to the National Society for local chapter charters. Action on the applications of these charters is now being taken and the National Organization welcomes these two groups of service men in furthering the work of the National Association through its local chapters.

Memphis, Tenn.

By E. B. Johnston, Secretary

A meeting was called February 11, at the United Refrigerator Service, 941 Madison Avenue, for the purpose of forming a local chapter to affiliate with the National Organization of the R. S. E. S. with headquarters in Chicago, Illinois.

The meeting was called to order at 7:30 P. M. by Mr. Boyd Evans, who gave an outline of its purpose, followed by a letter of explanation read by Mr. A. Davis, from the National Secretary, Mr. H. T. McDermott. After a discussion on the subject, a motion was made by Mr. Davis and seconded by Mr. Uetz, that Mr. W. Hall Moss be elected temporary President, which was carried. The following temporary officers were also elected: Mr. Geo. L. Uetz, First Vice-president, Mr. Boyd Evans, Second Vice-president, Mr. E. B. Johnston, Secretary, Mr. A. Davis, Treasurer, and Mr. C. J. Pipkin, Sergeant-at-Arms.

A petition for charter was signed by nineteen applicants, which was 100% of those in attendance.

As there was no other business in order, a motion for adjournment was made and carried, after which Mr. J. R. Woods and Mr. Boyd Evans served refreshments to the delight of all so inclined.

Minutes of February 25

The meeting was called to order by Mr. W. H. Moss, Temporary President, and the

CORRECTION IN CONVENTION DATES

Announcement was made in the February issue of the Second Annual Convention as October 24, 25 and 26. The correct dates are

DETROIT, MICH., OCTOBER 23, 24 and 25

minutes of the last meeting were read by the Secretary and approved.

A motion was made and seconded to hold over election of permanent officers until the required number of members had paid in their dues, which carried.

A letter was read by the Secretary from Mr. Geo. Uetz, our First Vice president, regretting his absence.

Papers were read by Secretary from the National Secretary and the Chairman of the Educational and Examining Board on educational proceedings of the meetings.

Dues were collected to bring the required membership up to the number necessary to file petition for charter.

Motion was made and seconded that the secretary and treasurer office be held by one man, namely Mr. E. B. Johnston, which carried.

Motion was made and seconded that the permanent officers, with the exception of Treasurer, be re-elected, which carried.

Motion was made and seconded that the local Secretary only pay the National dues of $3.75, local dues exempted, which carried.

Motion was made and seconded, also carried, requesting the transfer from the National Secretary, Mr. H. T. McDermott, of Mr. W. Hall Moss, a member-at-large, to the Memphis Chapter.

Motion was made and seconded, also carried, for the next meeting to be held Tuesday night, March 12, 1935, at 941 Madison Avenue.

Enthusiasm was a 100% of those in attendance.

Kansas City

By Jane Merritt

KANSAS CITY service men met on March 1st, at the Commonwealth Hotel to consider the possibilities and the advisability of forming a chapter of the Refrigeration Service Engineers' Society, to affiliate with the National Society.

This meeting was conducted by Mr. S. A. Leitner, Acting Chairman, who appointed Jane Merritt as acting secretary. After a short address by the Acting Chairman, he introduced Mr. H. T. McDermott, the National Secretary of the Refrigeration Service Engineers' Society, who explained in a very concise and thorough manner, the purposes and objects of the Society. After the fine presentation made by Mr. McDermott, he invited those desiring to ask questions to do so, which he answered to the utmost satisfaction in so far as they concerned the views and objects of the National Society.

After discussions in reference to the advisability of joining the National Society, a motion was made by Mr. J. M. Jackson that we make application and petition the National Society for a charter. This motion was seconded by Mr. Ray Bentley. A vote on the above action was taken which was unanimous.

The next order of business was the nomination and election of Temporary Officers, which were to consist of a President, Treasurer and Secretary, who were to serve in their respective capacities until a charter was granted by the National Society, when permanent officers will be elected. The final results of the election were as follows:

The nominations for the temporary president were Mr. W. R. Jones and Mr. S. A. Leitner. Mr. Jones declined the nomination in favor of Mr. Leitner in view of the fact that he was better qualified to handle this matter because of the fact that he was in contact with the National Society and has spent a great deal of his time in the preliminary work, to make possible this meeting, and other details of a formative character in regards to this society. A motion was therefore made by Mr. Jackson to nominate Mr. Leitner, who accepted, and was seconded by Mr. Roy E. Cox and Mr. W. R. Jones. The vote taken for this office was unanimous.

For the office of Treasurer, the name of Jane Merritt was suggested and was unanimously accepted. A motion by Mr. Roy E. Cox that Miss Merritt serve as temporary treasurer was seconded by Mr. F. J. Leitner. Miss Merritt accepted this office with the best wishes of all present. The vote was unanimous.

For the office of Secretary, the nomination of Mr. C. F. Ramey was suggested by Mr. Roy E. Bentley, who also made the mo-

tion to the effect. The motion was seconded by Mr. Jackson. A vote was taken, which was unanimous. Mr. Ramey gladly accepted the responsibility of this office.

The next order of business was the signing of the petition for a charter, which after being returned to Secretary Merritt's Desk, contained the following 29 names:

W. T. King	Leon V. Schmutz
C. E. Morrisey	C. L. Herbert
Jas. Dunn	W. R. Jones
J. P. Sloan	Roy Bentley
F. E. Furlow	J. M. Jackson
D. W. Ransdall	Ed Bentley
R. E. Kingsolver	Richard T. Ransdell
O. E. Kester	C. Kraus
G. L. Anderson	C. F. Ramey
A. T. Kreigh	F. J. Leitner
Jules DeWilde	L. H. Barry
Roy F. Cox	Aubrey P. Bryant
J. E. Altop	Jane Merritt
S. A. Leitner	W. P. Steiner
H. L. Green	

The acceptance of the constitution and by-laws was placed before the house by Temporary President Leitner. A motion was made by Mr. Richard Ransdell to accept the constitution and by-laws and was seconded by Mr. R. E. Kingsolver. The vote on the acceptance was unanimous.

The time, date and place of the next meeting was then placed before the house by Mr. F. E. Furlow, and after some discussion, it was suggested by Mr. Furlow, who also made the motion, that arrangements be made to secure the same meeting place, namely the Commonwealth Hotel, and the date of meeting to be on Thursday, March 14, and the time 8:00 P. M. This motion was seconded and carried.

After further discussions of various nature the meeting was adjourned.

S S S

KANSAS CITY HAS DISTINCTION OF FIRST WOMAN MEMBER OF SOCIETY

MISS JANE MERRITT, who was elected Temporary Treasurer of Kansas City Chapter, has the distinction of being the first woman to become a member of the National Organization. Miss Merritt is well-known among the refrigeration service companies of Kansas City as Manager of the Pollock Refrigeration Service, and from all accounts, has handled her job of managing this company as efficiently as any service man. We believe she enjoys the unique distinction of being the only woman in the industry in this capacity. Are we correct? We do know, however, that she may safely acclaim the honor of the first woman member of the Refrigeration Service Engineers' Society.

S S S

AKRON CHAPTER

Meeting of February 21

By Charles Hall, Secretary

AKRON Chapter of the Refrigeration Service Engineers' Society held a meeting at 376 S. Main St. at 7:30 P. M. on February 21, 1935.

Meeting was called to order with President Wall, and all officers present at the opening except Mr. Flowers who came a little later. Members were all present except Mr. Crisp.

The meeting was turned over to Mr. Price for educational program, starting with a lecture course, and having some good open discussions on various subjects. In the midst of our meeting, we were interrupted by a newspaper representative who outlined a plan of newspaper advertising covering a period of ten weeks. It was decided to have entire plan laid out and hold a meeting later of the service men, who would be interested in advertising through the paper. Mr. Brett was appointed chairman of the Advertising Committee.

At the close of the meeting, a letter was read from the Cleveland Chapter, inviting Akron Chapter to their meeting on February 22. Mr. Metzler from Williams & Company was present also, being a member of Cleveland Chapter, and he gave a personal invitation to come up to their meeting.

The meeting then adjourned at 10:00 P. M. until the first Thursday in March. The next meeting is to be held at McKim School, 120 Ash St.

S S S

J. Ziegler
Oklahoma

Here is my renewal. Keep up the good work on your interesting paper for service men.

CHICAGO CHAPTER CHATTER

By HERMAN GOLDBERG

Well, well, here we are again.

—Maybe we wouldn't have been so well if our president, Paul Jacobsen, had let go of that ball-peine hammer he seemed to pick up from nowhere during the little excitement at the end of the last meeting. The excitement suddenly subsided.

—Our genial Joe Corso is going to give a talk on delivery boy costs and also a talk on breweries on location. Well, all I've got to say on that is that Joe is the right man to speak on breweries. There is a strong rumor that he carries one around with him.

—Did you hear about the brand new service man who wanted to know if he could use his wife's nut cracker to crack flare nuts?

—Boy, oh boy! Our former treasurer and present member of the Board of Directors, Harry DeGan, attended the officers' meeting February 19th. The report has come to your scribe that our present treasurer, Ivar Skipple, was seen handing him some money. Maybe Harry was getting some of his own money back from the treasury. Who knows?

—Incidentally, I think the little fund that Ivar is building up by knocking the boys off on little extras when they buy their refreshments after the meeting is more substantial than the regular treasurer's fund. How about it, Skip?

—While we're at it, we would like to ask Pete Stein, that genial part of the Great Northern Refrigeration Co., if he expected to keep his marriage a secret. Pete just got married. We wish him a lot of luck.

—The next time Harry Drownes gets set to drop a bomb shell like he did at the close of our last meeting, I hope he'll give us enough warning beforehand. Personally, I'd like to have enough time to get out of the way of the firing line.

—Don't forget, fellows, to plan your vacation now. Make it for October 23, 24 and 25 so we can all attend the national convention in Detroit. The Detroit boys, I understand, are "cooking" up things.

—That's all for now, but always bear in mind that your scribe needs not only news of all kinds pertaining to our chapter but also the scandals and the stories that are going the rounds about the different refrigeration people. All communications will reach me at my place of business, 5101 W. Madison St., or phone me any time during the day at Austin 6343.

DETROIT CHAPTER

Meeting of February 20

THE regular meeting of Detroit Chapter was held at its usual meeting place, 6505 Grand River Ave., and in the absence of President J. H. Downs due to illness, Vice-President Charles Abel presided. The usual business of the meeting was dispensed with, because of the educational program planned. An unusually good attendance was present to hear Mr. Wiley and Mr. Laughlin of the Temprite Products Corp. give a most thorough talk on the operation and of service when required of the Temprite Cooler. Mr. Laughlin's talk was particularly interesting as it went into various types of installation and the reason for the successful operation of the Temprite when installed properly.

As a surprise guest of the evening, National Secretary H. T. McDermott dropped in and addressed the boys.

This was followed by reports from the Membership and Publicity Committees.

The meeting was adjourned at 11:10 P. M.

MILWAUKEE CHAPTER

Meeting of January 15

MILWAUKEE Chapter held its annual meeting for the election of officers for the ensuing year and the transaction of other business on January 15.

The officers selected to govern the activities of Milwaukee Chapter are:

President—Thos. Lester.
Vice-Pres.—Chester Burke.
Secretary—F. A. McLaughlin.
Treasurer—J. J. Geering.
Sergeant-at-Arms—Ray Heath.

Meeting of February 5

The meeting of February 5 was held at the School of Engineering, with President Thos. Lester presiding. After the usual business was disposed of an interesting demonstration and talk was given on the Norge Rollator Compressor. Mr. Ray Heath, sales engineer of the Taylor Electric Co., gave a talk on the design and operation, and a description of the component parts of the Norge Rollator. He stressed that the roller does not revolve at the shaft speed, simply rolling around the eccentric portion of the shaft. This operation practically eliminates any wear and is designed to prolong the life of the Rollator. He also said that it was important to remember that the parts are held to very close limits of accuracy. Mr. Walter Schmidt, service engineer for the Taylor Electric Co., gave a most interesting discussion of the proper methods of servicing the Norge Compressor, stressing the importance of care in replacing the seal. From the interest manifested by the questions asked among the members it was a definite indication that educational lectures of this kind are favored by the members of Milwaukee Chapter.

CHICAGO CHAPTER'S EDUCATIONAL PROGRAM

PRESIDENT JACOBSEN is a firm believer in planning the work of the Chapter to accomplish a definite result. As a consequence the educational program for the next four months has been outlined. The program follows:

EDUCATIONAL PROGRAM

for

March, April, May and June, 1935

Meeting Date	*Subject*	*Speaker*
March 12	Chicago's Refrigeration Code (Will Bring Inspector)	
	Window Displays for Selling Merchandise	Fred H. Roth
March 26	Frigidaire F-12 Changeover to SO_2	Clarke Forman
	The Portable Dehydrating Outfit	H. M. Armstrong
April 9	Servicing the Frigidaire Super-Line (1933)	B. H. Horne
	How to Make a Nizer Hi-Low Control Adjustment	Paul Jacobsen
April 23	Repairing and Adjusting Evaporators, Oil Logging, Etc.	R. B. Vanston
	Servicing the Kelvinator "Wonder" Model	J. S. Northcote
May 14	Business Management in General at the Shop	T. J. Fowler
May 28	Estimating Service Jobs	H. D. Busby
June 11	Breweries (On Location)	Joseph Corso
June 25	Modernizing the Old Style Servel Machine	R. L. Hendrickson

TALKS NOT YET SCHEDULED

How to Sell the Customer (Permanently) and to Make Repairs to Overcome Call-backs	Fred H. Roth
A Few Electrolux Service Pointers	R. B. Vanston
National Lecture Courses When Available (General Discussion on Course)	H. M. Armstrong C. E. Hamilton R. L. Hendrickson

J. A. Stevenson,
Ohio.

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Designed to Meet the Service Requirements of Practically Every Household Refrigerator, Water Cooler and Ice Cream Cabinet

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The Automatic Reclosing Circuit Breaker Co.
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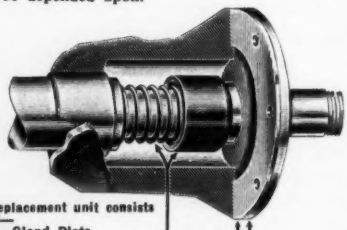

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Twenty-one Rotary Seal Replacement Units cover all popular makes of household compressors. Liberal discounts to established refrigeration service men.

ROTARY SEAL COMPANY
805 W. Madison St. Chicago, Ill.

being carried by that company, additional floor space has been taken.

In addition to larger inventories of items carried previously, a number of new lines have recently been added, according to Mr. C. E. Hamilton, of the firm.

The Company has recently been appointed distributor for Fedders Manufacturing Co. Other recent additions are Cutler-Hammer thermostats, a complete assortment of piston pins, piston rings, Hinsdale wrenches, tool boxes, and a more complete assortment of gaskets.

The Company is located at 410 N. Wells St., Chicago.

* * *

BURROUGHS INSTRUCTING SERVICEMEN IN NEW YORK CITY

MR. DILLON BURROUGHS, a member of the Chicago Chapter Refrigeration Service Engineers' Society, is at present spending six weeks in New York City where he is conducting post-graduate classes in the eastern instruction laboratory of Util-

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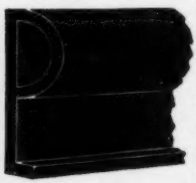

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This refrigeration school offers a course of training for refrigeration service men that combines a series of seventy-eight lessons for spare time home study with two weeks of shop practice on all types of household and commercial refrigerating equipment.

Their eastern instruction laboratory, which is maintained for the convenience of eastern students, is located at 1841 Broadway, New York. The Institute also maintains a laboratory at its Chicago headquarters.

Notification has been received that the Utilities Engineering Institute has been accepted for membership in the National Home Study Council.

As members are admitted only after rigid examination of the training courses offered, of the faculty teaching these courses and of the standards followed in the advertising, selling and conduct of the training, Utilities Engineering Institute is justly proud of its membership in the National Home Study Council.

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BRUSH-UP COURSES
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AIR CONDITIONING—
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Complete stock of Refrigerants, Carbon Tetrachloride, All White Compressor Oil, Penn Controls, Aminco Expansion Valves, Fedders Valves and Coils, Imperial Brass Flare and Sweat Fittings, Valves, Tools and Gauges, Copper Tubing, Motor Brushes and Bearings, Gates Belts, and Compressor Gaskets. All at lowest market price, f.o.b. Chicago.
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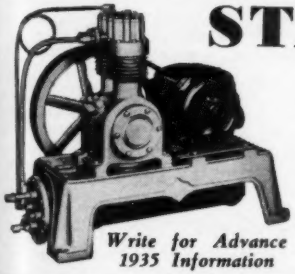
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RSE-3-35

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- ☐ Folder: Extra Dry ESOTOO (Liquid Sulphur Dioxide)
- ☐ Folder: V-METH-L (Virginia Methyl Chloride)
- ☐ Folder: Transferring from large to small cylinders
- ☐ Circular: Physical properties of various refrigerants

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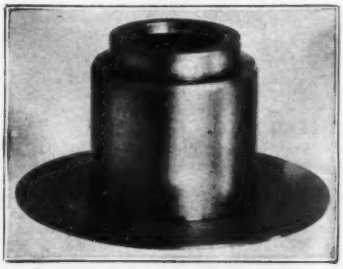

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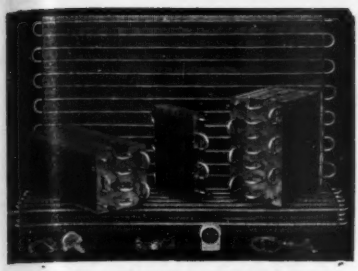

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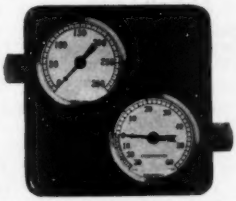

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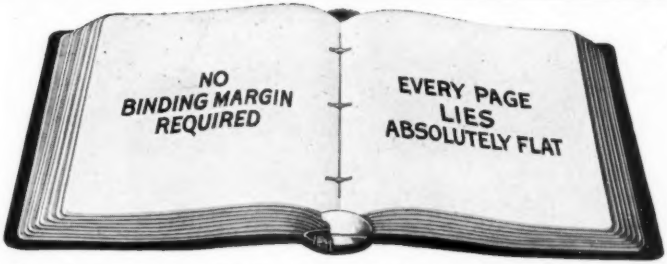

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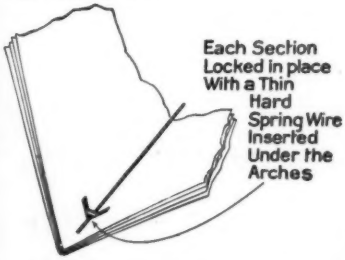

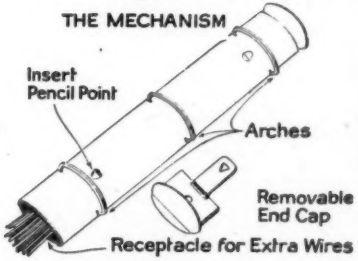

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